No. 773,467. PATENTED OCT. 25, 1904.

W. L. BRADSHAW.

ELECTRIC SWITCH.

APPLICATION FILED FEB. 24, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

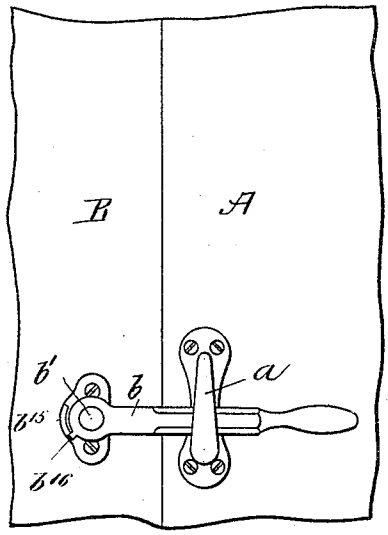


Fig. 1.

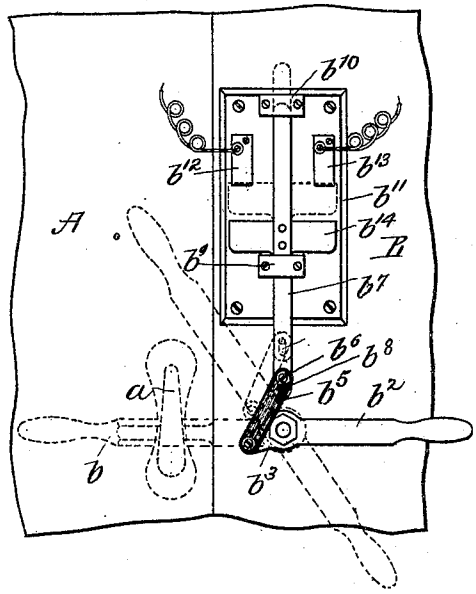


Fig. 2.

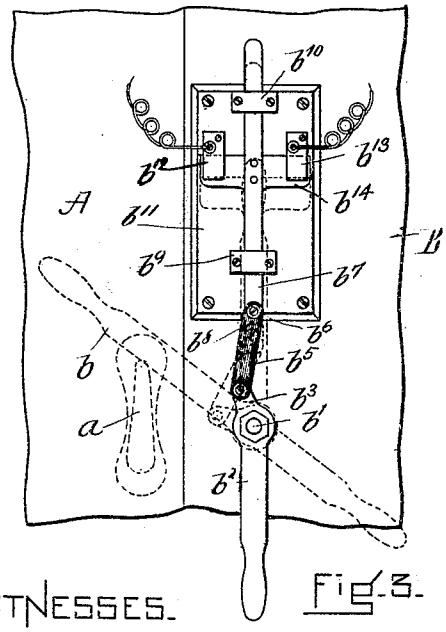


Fig. 3.

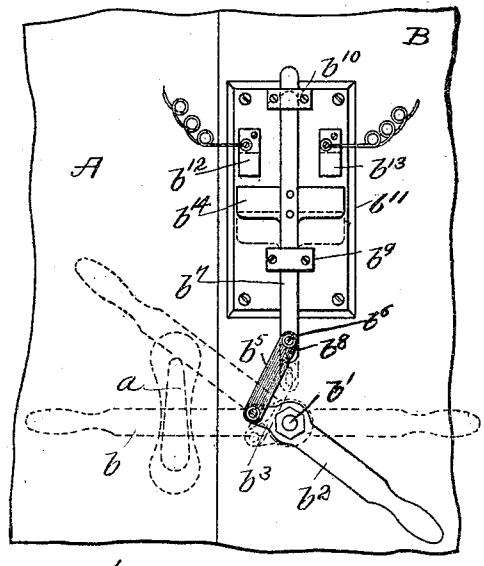


Fig. 4.

WITNESSES.

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NO MODEL. 2 SHEETS—SHEET 2.

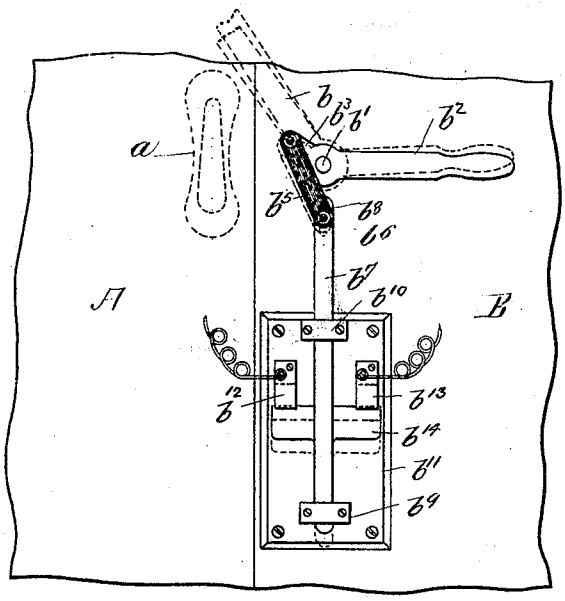


Fig. 5.

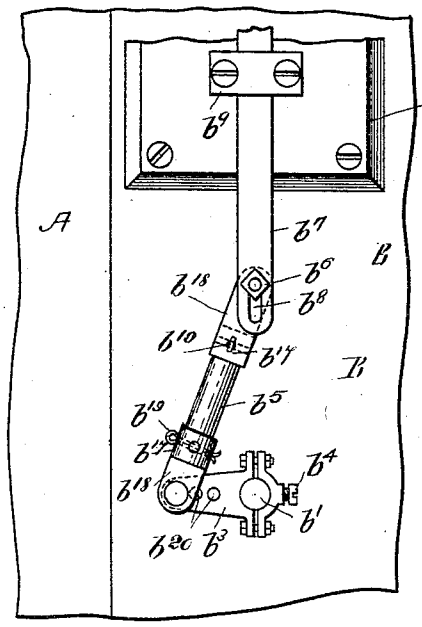


Fig. 6.

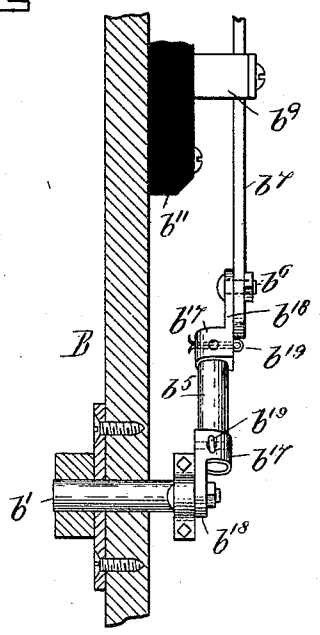


Fig. 7.

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UNITED STATES PATENT OFFICE.

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ELECTRIC SWITCH.

SPECIFICATION forming part of Letters Patent No. 773,467, dated October 25, 1904.

Application filed February 24, 1904. Serial No. 195,016. (No model.)

To all whom it may concern:

Be it known that I, WALTER L. BRADSHAW, a citizen of the United States, and a resident of Cambridge, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Electric Switches, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

My invention relates to an improvement in electric switches, and especially to a switch used in connection with a circuit for electrically lighting ice-chests or refrigerators where the lights are automatically turned on or off by movement in one direction or the other of the refrigerator-door or by turning its knob or handle, whereby the circuit becomes opened or closed, as occasion may require. As commonly used in such connection that portion of the switch by which the circuit is made or broken is controlled by a spring or the like, so that at the moment of breaking the circuit the spring will act to throw back the circuit-breaker with a quick action and sufficiently far to prevent the formation of an arc which might otherwise be formed at such time. The use of a spring, however, or any such auxiliary means of producing this effect is objectionable, because the spring is likely to become broken or disarranged, and especially so in refrigerators owing to moisture and the presence of ammonia-gas which acts to corrode the spring. A spring, therefore, being thus likely to become disarranged, weakened, or broken may not act properly or fail to act at all, with the effect that a proper breakage of the circuit is not obtained and an arc is formed which may cause a fire owing to the near proximity of wood or other combustible. By my invention, however, the use of a spring in a switch of this kind is dispensed with and a proper breakage of the circuit for preventing an arc obtained by having the circuit-breaker make its disconnection with a gravity drop, by which action a sure exceedingly quick disconnection is obtained and with a length of drop or breakage such that the danger of an arc being formed is reduced to a minimum.

I have shown my improved switch as used in connection with the handle of a refrigerator-door, so that the circuit may be closed and the lights turned on by the throw of the handle in one direction for opening the door and the circuit broken and the lights turned off by the throw of the handle in a reverse direction to lock the door after it has become closed, which adaptation of my invention, together with various incidental details of construction, can best be seen by reference to the drawings, in which—

Figure 1 shows in plan a portion of the outside of a door and adjacent casing, which door and casing are fitted with a cam-lock of well-known character. Figs. 2, 3, and 4 show in plan the inside of said portion of the door and casing fitted with my improved switch, the switch being shown in different positions, breaking or closing the circuit, this dependent upon the position of the handle of the door, as will hereinafter be explained. Fig. 5 shows a modified method of placing my switch for obtaining its proper action, as will hereinafter be explained. Figs. 6 and 7 show enlarged details of certain incidental features of construction, to which reference will hereinafter be made.

In the drawings, A represents a portion of a refrigerator-door, and B a portion of its adjacent casing. The door, on the outside, is shown in Fig. 1 fitted with a cam-lock of common form, comprising a handle b, fixed on a shaft b', in the casing and turning to rest when the door is closed in a hook or catch a, fixed to the door, by which connection it becomes locked. The shaft b', upon which the handle turns, passes through the casing and upon the inside is fitted with an inside handle b^2, reversely arranged to the handle b on the outside in order that the handle b may be controlled and the door locked or unlocked from within.

b^3 is a crank also secured to the end of the shaft b' inside the casing. This crank may be secured to the shaft in any suitable man-

ner, preferably in the manner shown in Fig. 6, where the crank is represented as comprising two parts bolted together about the shaft and provided with a set-screw b^4, by which it may be fixed thereto at any relative position. Pivoted to the end of the crank is a link b^5, made of some insulating material, which link is pivoted by a pin b^6 to a gravity-bar b^7, having in its end a longitudinal slot b^8, through which the pin passes. It is evident that the gravity-bar b^7 so retained can play by the length of its slot upon the pin b^6 or if lifted when vertically disposed and then let go would drop or fall by gravity the same distance. For this purpose I preferably show the bar having a direct vertical disposition passing up through guides b^9 b^{10}, arranged upon an insulating-board b^{11}, fixed to the casing of the door or other fixture, by which guides the gravity-bar is retained to slide up and down. Upon the board b^{11} upon either side of the gravity-bar b^7 are also arranged terminals b^{12} b^{13}, representing the disconnected ends of the circuit, the same taking the form of friction-clips capable of receiving and holding a circuit-controlling cross-bar b^{14} when made to engage with the same. This cross-bar b^{14} is fixed to the gravity-bar b^7 to be movable with it, and so be made to connect or engage with the clips forming the terminals, so completing the electric circuit, or with reverse movement made to be drawn away or be disconnected from the same, so breaking the circuit.

The operation of my improved switch is as follows: Assuming that the refrigerator-door is closed and locked, with the handle b on the outside resting in the hook or catch a, as shown in Fig. 1, then upon the inside of the door, as shown in the full lines of Fig. 2, the handle b^2 would be reversely arranged and the crank b^3, through the link b^5 and gravity-bar b^7, disposed to hold the circuit-controlling cross-bar b^{14} at a maximum distance away from the terminals of the circuit, which being thus broken the lights of course would be extinguished. For unlocking the door the handle b would be turned back, when the crank b^3, influenced by such turning, would, through the connecting-link and gravity-bar, raise the circuit-controlling cross-bar toward the terminals b^{12} b^{13} for completing the circuit, (this substantially as shown in the dotted lines of Fig. 2, the handle b being there represented as turned to such position that the crank b^3 and intermediate parts are shown holding the circuit-controlling cross-bar at a point just making connection with the terminals of the circuit.) Upon further movement of the handle the circuit-controlling cross-bar is still further raised and made to enter or engage with the clips forming the terminals, (see full lines of Fig. 3.) which clips also act to receive and retain said bar, so completing the circuit and turning on the lights ready for the opening of the door. Now upon closing the door the handle b would be turned back for the purpose of locking it, consequent upon which movement the crank-connecting link and gravity-bar reversely moved would draw back the circuit-controlling cross-bar, (as shown in the dotted lines of Fig. 3, where the circuit-controlling cross-bar is represented as drawn to a position just breaking with the terminals of the circuit,) and in this connection it is to be noted that the draft of the pin b^6, joining the link b^5 to the gravity-bar, would be from the lower end of its slot, inasmuch as the gravity-bar would be held by the grasp or retention of the terminal clips upon the circuit-controlling cross-bar fixed to it. By a slight further movement of the handle the cross-bar b^{14} would be drawn away from the retaining-clips or terminals, at which moment it would drop by gravity the length of the slot cut in the gravity-bar. (See full lines in Fig. 4.) This gravity drop being quick and for some considerable distance would practically eliminate all danger from an arc being formed at the moment of the circuit being broken. By a slight further movement of the handle it would be made to resume its position first mentioned, as shown in Figs. 1 and 2, the door locked, the circuit-controlling cross-bar drawn fully away from the terminals, and the lights extinguished.

In order that the handle b may not have an excessive amount of play or throw or such as might tend to disarrange the parts of the switch, I have arranged a fixed stop b^{15}, acting when the handle in unlocking the door has been turned to a point where the circuit-controlling cross-bar has made full connection with the terminal clips, as in the full lines of Fig. 3, to prevent its further backward movement, and, reversely, when the handle is turned in the other direction for locking the door I have arranged a lug b^{16}, turning on the end of the handle, to contact with the fixed lug b^{15} at the moment the handle rests in its catch, (see Fig. 1,) the lug so acting to prevent further movement of the handle, and so disarrangement of the parts, especially in case by accident the handle was turned down when the door was open, when of course it would not rest in its catch.

In Fig. 5 I have shown a slight modification of the invention. Here the switch is shown just reversely placed from the way shown in the preceding figures, the crank b^3 upon turning the handle for unlocking the door acting, through the link b^5 and gravity-bar b^7, to draw up the circuit-controlling cross-bar b^{14} to make engagement with the terminal clips of the circuit for closing the same and, reversely, for pulling away said cross-bar from the grasp or retention of the clips for breaking the circuit when the handle is turned the other way for locking the door. I have shown in the full lines of this Fig. 5 the cross-bar

just on the point of breaking with the terminal clips and then in dotted lines the bar fallen away from them or after its gravity drop, which is obtained by a slight further movement of the handle, for in this case, as before explained, the gravity-bar by reason of its slot will drop when its cross-bar b^{14} is freed from the grasp of its terminal clips, and so, of course, the cross-bar drops with it, it being fixed thereto. It therefore makes no difference whether the switch is placed to extend upward or downward, the gravity drop, which is the essential factor, will still be obtained. The switch might be placed in this modified position for various structural reasons, and this leads to a further consideration.

Of course the conditions, structural and otherwise, under which the improved switch might be used would vary. Difficulty might especially be found in adapting it to structures where the shaft connecting with the operating-handle or that part corresponding with the shaft b' (shown in the drawings) would be found very short or the adjacent structure such that a proper disposition of the switch could not be easily obtained or so that its parts might freely operate. For a short length of shaft, therefore, I make the crank b^3 as before explained in order that it may be self-securing to the end of the shaft without the necessity of having an auxiliary locking nut or nuts. Then in order that a proper connection between the crank b^3 and the gravity-bar b^7 may be obtained, whatever their relative positions may be, I provide the connecting-link b^5 with adjustable end pieces, each comprising a portion b^{17} combining with the end of the link in the nature of a ferrule, which has extending from it at one side a flange b^{18}, by which flanges for the respective pieces connection is made with the crank at one end and the sliding bar at the other end of the link. The end pieces are secured to the respective ends of the link by pins b^{19}, and the pieces are made so that they may be reversely arranged relatively to the link or so that the flanges b^{18} may extend, relatively speaking, one from the one side and the other from the other side of the link, or both from the same side, their adjustment of course depending upon the relative lateral disposition of or distance separating the crank and gravity-bar. As furthering also the adjustment and facilitating the arrangement of the parts the crank b^3 is furnished with a plurality of holes b^{20}, by which means the link b^5 may make pivotal connection with the crank at any one of several points distant from its axial center of turning, so determining the relative amount of throw of the crank and the consequent degree of movement of the gravity-bar, this dependent upon the particular circumstances of usage.

As I have already said, the essential importance of my invention resides in the fact that I have eliminated the spring which usually forms a part of the switch used in a similar connection to the one I have described. Besides this, the switch is of exceedingly simple mechanical structure. There is practically nothing to give out or break, and in this connection I would say that I prefer to make all the metal parts of the switch of some non-corrosive material. The absolute disconnection of the circuit-controlling cross-bar at the moment of the breakage of the circuit is sure and constant as gravity is constant, for on that it depends. The switch is also made of a double-break character, making or breaking with both terminals of the circuit, and so insuring thorough separation and tending to diminish the spark. Then, again, the facility with which the switch may be adapted to various structural conditions increases, of course, its utility.

While I have described my improved switch as especially applicable to a refrigerator or ice-chest, it can of course, so far as the essence of the invention is concerned, be used in any connection to which it is applicable.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. In a switch of the character specified, the combination of a gravity-bar, a circuit-controlling member carried thereby to make or break connection with a clip forming one of the terminals of an electric circuit, said clip, the same being adapted to releasably grasp or retain said circuit-controlling member when made to engage therewith, and means loosely connecting with said gravity-bar for operating the same whereby the circuit-controlling member carried by the gravity-bar may be lifted to make engagement with said clip or be withdrawn to break therefrom and at the moment of such breakage fall by gravity from said clip by a drop of the gravity-bar.

2. In a switch of the character specified, the combination of a gravity-bar having a slot cut therein, a circuit-controlling member carried thereby and adapted to make or break connection with the terminals of an electric circuit, said terminals of the circuit, one or both of which is made in the form of a clip to grasp and retain said circuit-controlling member when made to engage therewith, and means for actuating said gravity-bar to make or break connection with the terminals of the electric circuit by a pin passing through the slot cut therein.

3. In a switch of the character specified, the combination of a crank-shaft, an operating-handle, a crank arranged on said shaft, a gravity-bar having a slot cut therein, a link connecting said crank with said gravity-bar and engaging therewith by a pin passing through the slot cut therein, a circuit-controlling cross-bar carried by said gravity-bar to make or break connection with the terminals of an electric circuit, said terminals of the circuit disposed on either side of said gravity-bar, adapt-

ed to grasp and releasably retain said circuit-controlling cross-bar when made to engage therewith and whereby said cross-bar when released by the operating means aforesaid from the grasp of said clips will drop by gravity the length of the slot cut in the gravity-bar, substantially as described.

4. In a switch of the character specified, the combination of a crank, a gravity-bar having a slot cut therein, means joining said crank and gravity-bar by a pin passing through said slot, a circuit-controlling member carried by said gravity-bar and made to make or break connection with the terminals of an electric circuit, said terminals, one or both of which is made in the form of clips adapted to releasably grasp or retain said circuit-controlling member when made to engage therewith and whereby said circuit-controlling member by means of the slot cut in the gravity-bar will drop away from said terminals at the moment of its breaking connection therewith.

5. In a switch of the character specified, the combination of a gravity-bar having a slot cut therein, a circuit-controlling member carried by said gravity-bar adapted to make or break connection with the terminals of an electric circuit, said terminals, one or both of which is made in the form of a clip adapted to releasably grasp or retain said circuit-controlling member when made to engage with the same and whereby said circuit-controlling member by means of the slot cut in the gravity-bar will drop away from said terminal or terminals at the moment of its breaking connection therewith, and means for operating said gravity-bar for obtaining the movement aforesaid, the same comprising a crank and a connecting-link, said link connecting with the gravity-bar by means of a pin passing through the slot cut therein and which link is also provided with reversible end pieces whereby said link may make proper connection between the crank and gravity-bar dependent upon their relative positions.

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Witnesses:
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M. V. FOLEY.